

RAJEEV GANDHI MEMORIAL COLLEGE OF ENGINEERING & TECHNOLOGY

AUTONOMOUS

Affiliated to JNTUA - Anantapuramu, Approved by AICTE - New Delhi,
Accredited by NBA - New Delhi, Accredited by NAAC of UGC with A-Grade
NANDYAL-518 501, KURNOOL Dist., A.P.

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

COMPUTER SCIENCE ENGINEERING



Estd: 1995

**ACADEMIC REGULATIONS,
COURSE STRUCTURE AND SYLLABI
APPLICABLE FOR STUDENTS ADMITTED INTO
M.TECH (REGULAR) FROM 2015-16**

RAJEEV GANDHI MEMORIAL COLLEGE OF ENGINEERING & TECHNOLOGY
AUTONOMOUS
COMPUTER SCIENCE ENGINEERING
 (Affiliated to J.N.T.U.A, Ananthapuramu)
ACADEMIC REGULATIONS, COURSE STRUCTURE AND DETAILED SYLLABI
M.Tech. (Regular) from 2015-16

For pursuing Two year Master (post graduate) Degree of study in Engineering (M.Tech.), offered by Rajeev Gandhi Memorial College of Engineering and Technology, Nandyal - 518501 under Autonomous status and herein referred to as RGM CET (Autonomous).

All the rules specified herein approved by the Academic Council will be in force and applicable to students admitted from the Academic Year 2015-16 onwards. Any reference to "Institute" or "College" in these rules and regulations shall stand for Rajeev Gandhi Memorial College of Engineering and Technology (Autonomous).

All the rules and regulations, specified hereafter shall be read as a whole for the purpose of interpretation as and when a doubt arises, the interpretation of the Chairman, Academic Council is final. As per the requirements of statutory bodies, the Principal, Rajeev Gandhi Memorial College of Engineering and Technology shall be the Chairman, Academic Council.

Academic Regulations 2015 for M.Tech. (Regular)

(Effective for the students admitted into first year from the Academic Year 2015-2016)

The M.Tech. Degree of Jawaharlal Nehru Technological University Anantapur, Ananthapuram shall be conferred on candidates who are admitted to the M.Tech. program at RGM CET, Nandyal and they shall fulfil all the requirements for the award of the Degree.

1.0 Eligibility for Admissions:

Admission to the above program shall be made subject to the eligibility, qualifications and specialization prescribed by Andhra Pradesh State Council of Higher Education (APSCHE) from time to time.

Admissions shall be made on the basis of merit rank obtained in GATE examination or PG CET conducted by any University of Andhra Pradesh designated by Govt. of A. P., or on the basis of any other order of merit prescribed by APSCHE, subject to the reservations prescribed by the Government of A. P. from time to time.

2.0 Award of M.Tech. Degree:

2.1 The student shall be declared eligible for the award of the M.Tech. degree, if he/she pursues a course of study and completes it successfully for not less than prescribed course work duration and not more than double the prescribed course work duration.

2.2 The student, who fails to fulfil all the academic requirements for the award of the degree within double the course work duration from the year of his admission, shall forfeit his seat in M.Tech. course.

2.3 The minimum clear instruction days for each semester shall be 95.

3.0 Courses of Study:

The following specializations are offered at present for the M.Tech. course of study.

1. Computer Science (CSE)
2. Digital Systems and Computer Electronics (ECE)
3. Embedded Systems (ECE)
4. Machine Design (Mechanical Engineering)
5. Power Electronics (EEE)
6. Software Engineering (IT)
7. Structural Engineering (CE)

and any other course as approved by the appropriate authorities from time to time.

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4.0 Course pattern:

- 4.1** The entire course of study is of four semesters. During the first and second semesters the student has to undergo course work and during the third and fourth semesters the student has to carry out project work.
- 4.2** The student shall be eligible to appear for the End Examination in a subject, but absent at it or has failed in the End Examination may appear for that subject at the supplementary examination.

Table 1: Credits

Subject	Semester			
	Periods /Week	Credits	Internal marks	External marks
Theory	04	04	40 (25 Internal Test+15 Assignment)	60
Practical	03	02	50	50
Seminar		02	100	
Comprehensive Viva – voce 1		02		50
Comprehensive Viva - voce 2		02		50
Project		12		

Table2: Course pattern

Semester	No.of Subjects	Number of Labs	Total credits	
First	04-Subjects 01-Elective 01-MOOC/Elective	02 - Labs Comprehensive Viva -1	04X4=16 01X4=04 01X4=04 02X2=04 01X2=02	30
Second	04-Subjects 01-Elective 01-MOOC/Elective	02 - Labs Comprehensive Viva -2	04X4=16 01X4=04 01X4=04 02X2=04 01X2=02	30
Third	Seminar (3 rd semester) Intermediate Evaluation of Project work (3 rd semester)			02 04
Fourth	Project Work			08
Total credits				74

5.0 Attendance:

- 5.1** The candidate shall be deemed to have eligibility to write end semester examinations, if he has secured a minimum of 75% of attendance in aggregate of all the subjects.
- 5.2** Condonation of shortage of attendance up to 10%, i. e. 65% and above and below 75% may be given by the College academic committee consisting of Principal, Head of the Department and a senior faculty member.
- 5.3** Condonation of shortage of attendance shall be granted only on genuine and valid reasons on representation by the candidate with supporting evidence.
- 5.4** **Shortage of attendance below 65% shall in no case be condoned.**
- 5.5** The candidate shall not be promoted to the next semester unless he fulfils the attendance requirements of the previous semester.

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5.6 Attendance in each subject will be recorded in the marks memo.

5.7 **The attendance in each subject will be recorded in the Marks memo.**

6.0 Evaluation:

6.1 For theory subjects the distribution shall be 40 marks for Internal Evaluation (25 marks for Internal test and 15 marks for assignments/ field work) and 60 marks for the End-Examination.

6.2 Each Internal Test question paper shall contain 5 questions, of which the First question is compulsory and three questions are to be answered from the remaining four. Compulsory question carries 10 marks (It contains 5 short answer questions). The remaining 3 questions carry 5 marks each. Each question shall have a,b,c.... parts. The duration of internal test will be for 2 hours. First test to be conducted in 3 units in the middle of the semester and second test to be conducted in the remaining 3 units of each subject at end the semester. There shall be two assignments in each subject (problem based/ field work) for the award of 15 marks so that internal component (marks) will be 40 marks (25 marks for internal test+15 marks for assignments / field work). For awarding of 25 Internal marks the performance of the student in two internal examinations conducted will be considered by giving a weightage of 0.75 for the better score and 0.25 for the other score.

6.3 The End Examination question paper will have 7 questions and students have to answer 5 questions. However, the first question is compulsory and it consists of 6 short answer questions, each carrying 2 marks. The next 4 questions are to be answered from the remaining 6 questions and each carries 12 marks. Each 12 marks question shall have a, b, c .. parts.

6.4 Elective subjects will commence from 1st semester. Out of the electives offered in 1st / 2nd semester, one elective will be MOOC / Electives offered by the department. Any student who is interested can opt for the MOOC/ Electives offered by the department and acquire the required credits. Even if the student opts MOOC, he has to write two internal tests besides the end examination conducted by the institute like other subjects. However, he has to obtain the certificate from the organization in which he has registered. Any MOOC selected by the student should be of more than 45 hours duration and also from the reputed organization. Attendance of the student who has opted for MOOC will be taken from the remaining subjects and labs only in that semester while finalizing the attendance for fulfilling the minimum requirements of attendance for promotion to next semester. Attendance will not be recorded for MOOC. Where ever MOOC is opted by the student, the evaluation procedure will be similar to any subject offered by the department.

6.5 For practical subjects, 50 marks shall be for the End Semester Examinations and 50 marks will be for internal evaluation based on the day-to-day performance. Laboratory examination for M.Tech.. Course shall be conducted with two Examiners, one of them being Laboratory Class Teacher and second Examiner shall be outside from the institute (External examiner).

6.6 Student has to undergo a comprehensive viva pertaining to his specialization which carries 50 marks in each semester. He has to secure 50% marks to obtain required credits. Comprehensive viva will be conducted at the end of 1st and 2nd semester by the committee consisting of HOD, senior faculty member and external Examiner from outside the institute. For this, HOD of the Department shall submit a panel of 4 Examiners, who are eminent in that field. One from the panel will be selected by the principal of the institute as external Examiner for comprehensive viva.

6.7 For Seminar 100 marks shall be for internal evaluation. The candidate has to secure a minimum of 50 marks to be declared successful. The assessment will be made by a board consisting of HOD and two internal experts at the end of 3rd semester.

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- 6.8** The candidate shall be deemed to have secured the minimum academic requirement in a subject if he secures a minimum of 40% of marks in the End Examination and a minimum aggregate of 50% of the total marks in the End Examination and Internal evaluation taken together.
- 6.9** In case the candidate does not secure the minimum academic requirement in any subject (as specified in 5.0), he has to reappear for the Semester Examination either supplementary or regular in that subject, or repeat the course when next offered or do any other specified subject as may be required.

7.0 Re-registration for improvement of Internal marks:

Following are the conditions to avail the benefit of improvement of internal marks.

- 7.1** The candidate should have completed the course work and obtained examinations results for 1st & 2nd semesters.
- 7.2** He should have passed all the subjects for which the internal marks secured are more than 50%.
- 7.3** Out of the subjects the candidate has failed in the examination due to Internal marks secured being less than 50%, the candidate shall be given one chance for each Theory subject and for a maximum of three Theory subjects for Improvement of Internal marks.
- 7.4** The candidate has to re-register for the chosen subjects and fulfil the academic requirements as and when they are offered.
- 7.5** For each subject, the candidate has to pay a fee equivalent to one tenth of the semester tuition fee and the amount is to be remitted in the form of D. D. in favour of the Principal, RGM CET payable at RGM CET, Nandyal branch along with the requisition through the HOD of the respective Department.
- 7.6** In case of availing the Improvement of Internal marks, the internal marks as well as the End Examinations marks secured in the previous attempt (s) for the re-registered subjects stand cancelled.

8.0 Evaluation of Project / Dissertation work :

Every candidate shall be required to submit thesis or dissertation after taking up a topic approved by the Department.

- 8.1** Registration of Project work: The candidate is permitted to register for the project work after satisfying the attendance requirement of all the courses (theory and practical courses of 1st & 2nd Sem)
- 8.2** An Internal Department Committee (I.D.C.) consisting of HOD, Supervisor and One Internal senior expert shall monitor the progress of the project work.
- 8.3** The work on the project shall be initiated in the penultimate semester and continued in the final semester. The duration of the project is for two semesters. The candidate can submit Project thesis with the approval of I.D.C. after 36 weeks from the date of registration at the earliest. Extension of time within the total permissible limit for completing the programme is to be obtained from the Head of the Institution.
- 8.4** The student must submit status report at least in three different phases during the project work period. These reports must be approved by the I.D.C. before submission of the Project Report.
- 8.5** The candidate shall be allowed to submit the thesis/dissertation only after passing in all the prescribed subjects (both theory and practical) and then take viva voce examination of the

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project. The viva - voce examination may be conducted once in two months for all the candidates submitted during that period.

- 8.6** Three copies of the Thesis/Dissertation certified in the prescribed form by the supervisor & HOD shall be submitted to the institute.
- 8.7** The Department shall submit a panel of 4 experts for a maximum of 4 students at a time. However, the thesis/dissertation will be adjudicated by the board consists of HOD, concerned supervisor and one external Examiner from other institute nominated by the principal from a panel of Examiners submitted by the Department HOD to the Controller of Examinations.
- 8.8** If the report of the board is favourable in viva voce examination, the board shall jointly report candidates work as:
1. Good
 2. Satisfactory
 3. Not satisfactory

If the report of the viva voce is not satisfactory the candidate will retake the viva voce examination after three months. If he fails to get a satisfactory report at the second viva voce examination he will not be eligible for the award of the degree unless the candidate is permitted to revise and resubmit the thesis.

9.0 Award of Degree and Class:

After the student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of M. Tech. Degree he shall be placed in one of the following classes:

Table 3: Award of division

Class Awarded	% of marks to be secured	Division/ Class	CGPA	From the aggregate marks secured from the 74 Credits.
First Class with Distinction	70% and above	First Class With Distinction	≥ 7.5	
First Class	Below 70% but not less than 60%	First Class	$6.5 \text{ and } < 7.5$	
Second Class	Below 60% but not less than 50%	Second Class	$\geq 5.5 \text{ and } < 6.5$	

(The marks in internal evaluation and End Examination shall be shown separately in the marks memorandum)

10.0 Grading:

After each subject is evaluated for 100 marks, the marks obtained in each subject will be converted to a corresponding letter grade as given below, depending on the range in which the marks obtained by the student falls.

Table 4: Conversion into Grades and Grade points assigned

Range in which the % of marks in the subject fall	Grade	Grade point Assigned	Performance
90 to 100	O	10	Outstanding
80 to 89.9	A ⁺	09	Excellent
70 to 79.9	A	08	Very good
60 to 69.9	B ⁺	07	good
50 to 59.9	B	06	Pass
<50	F	00	Fail
Ab	AB	00	Fail

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- 10.1** Requirement for clearing any subject: The students have to obtain a minimum of 40% in End Examination and they have to score minimum of 50% marks from Internal and external exam marks put together to clear the subject. Otherwise they will be awarded fail grade.
- 10.2** F is considered as a fail grade indicating that the student has to reappear for the end supplementary examination in that subject and obtain a non fail grade for clearing that subject.
- 10.3** To become eligible for the award of degree the student must obtain a minimum CGPA of 6.0.

11.0 Supplementary Examinations:

Apart from the regular End Examinations the institute may also schedule and conduct supplementary examinations for all subjects for the benefit of students with backlogs. Such students writing supplementary examinations as supplementary candidates may have to write more than one examination per day. The student is not permitted to improve his performance in any subject in which he has obtained pass grade.

12.0 Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA)

The Grade Point Average (GPA) for each semester and Cumulative Grade Point Average (CGPA) up to any semester are calculated as follows:

- i) Semester Grade Point Average will be computed as follows:

$$GPA = \frac{\sum_1^n C_i \times GP_i}{\sum_1^n C_i}$$

Where, n is the number of subjects in that semester. C_i is Credits for the subjects. GP_i is the grade point obtained for the subject and the summation is over all the subjects in that semester.

- ii) A Cumulative Grade Point Average (CGPA) will be computed for every student at the end of each semester. The CGPA would give the cumulative performance of The student from the first semester up to the end of the semester to which it refers and is calculated as follows

$$CGPA = \frac{\sum_1^m GPA_j \times TC_j}{\sum_1^m TC_j}$$

Where 'm' is the number of semester under consideration. TC_j the total number of credits for a j^{th} semester and GPA_j is the Grade Point Average of the j^{th} semester. Both GPA and CGPA will be rounded off to the second digit after decimal and recorded as such.

While computing the GPA / CGPA the subjects in which the student is awarded zero grade points will also be included.

13.0 Grade Sheet:

A grade sheet (Memorandum) will be issued to each student indicating his performance in all subjects of that semester in the form of grades and also indicating the GPA and CGPA.

14.0 Transcripts:

After successful completion of prerequisite credits for the award of degree a Transcript containing performance of all academic years will be issued as a final record. Duplicate transcripts will also be issued if required after the payment of requisite fee and also as per norms in vogue.

15.0 Minimum Instruction Days:

The minimum instruction days for each semester shall be 95 clear instruction days excluding the days allotted for tests/examinations and preparation holidays declared if any.

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16.0 Amendment of Regulations:

The college may, from time to time, revise, amend or change the regulations, scheme of examinations and syllabi. However the academic regulations of any student will be same throughout the course of study in which the student has been admitted.

17.0 Transfers

There shall be no branch transfers after the completion of admission process.

18.0 Withholding of results:

If the candidate has not paid any dues to the institute or if any case of in-discipline is pending against him, the result of the candidate will be withheld and he will not be allowed for the next semester. The issue of the degree is liable to be withheld in such cases.

19.0 Transitory Regulations:

Candidates who have discontinued or have been detained for want of attendance are eligible for admission to the same or equivalent subjects as and when subjects are offered, subject to 2.0 and 5.0.

20.0 Rules of Discipline:

20.1 Any attempt by any student to influence the teachers, Examiners, faculty and staff of Examination section for undue favours in the exams, and bribing them either for marks or attendance will be treated as malpractice cases and the student can be debarred from the college.

20.2 When the student absents himself, he is treated as to have appeared and obtained zero marks in that subject (s) and grading is done accordingly.

20.3 When the performance of the student in any subject (s) is cancelled as a punishment for indiscipline, he is awarded zero marks in that subject (s).

20.4 When the student's answer book is confiscated for any kind of attempted or suspected malpractice, the decision of the Chief Superintendent is final.

21.0 General:

21.1 The Academic Regulations should be read as a whole for the purpose of any interpretation.

21.2 In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the College Academic Council is final.

21.3 The Institute may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the Institute.

21.4 *Where the* words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".

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COURSE STRUCTURE

I M.TECH, I-SEMESTER (CSE)

Code	Subject	Theory	Practical	Credits	Scheme of Examination		
					Internal Marks	External Marks	Total Marks
D0501151	Operating Systems	4	-	4	40	60	100
D0502151	Advanced Data Structures and Algorithms	4	-	4	40	60	100
D0503151	Computer Organization	4	-	4	40	60	100
D0504151	Database Management Systems	4	-	4	40	60	100
D0505151	Software Engineering	4	-	4	40	60	100
D0506151	Web Technologies	4	-	4	40	60	100
D0507151	ADS & DBMS Lab	-	3	2	50	50	100
D0508151	Web Technologies Lab	-	3	2	50	50	100
D0509151	Comprehensive Viva-I			2		50	50
Total		24	6	30	340	510	850

I M.TECH, II-SEMESTER (CSE)

Code	Subject	Theory	Practical	Credits	Scheme of Examination		
					Internal Marks	External Marks	Total Marks
D0510152	Mobile Application Development	4	-	4	40	60	100
D0511152	Object Oriented Analysis and Design	4	-	4	40	60	100
D0512152	Computer Networks	4	-	4	40	60	100
D0513152	Data Warehousing and Data Mining	4	-	4	40	60	100
	Elective-I	4	-	4	40	60	100
	Elective-II	4	-	4	40	60	100
D0522152	OOAD Lab	-	3	2	50	50	100
D0523152	Data Warehousing and Data Mining Lab	-	3	2	50	50	100
D0524152	Comprehensive Viva-II			2		50	50
Total		24	6	30	340	510	850

Code	Elective – I	Code	Elective – II
D0514152	Software Quality Assurance and Testing	D0518152	Human Computer Interaction
D0515152	Advanced Computer Architecture	D0519152	Software Project Management
D0516152	Distributed Databases	D0520152	Image Processing
D0517152	Storage Area Networks	D0521152	Distributed Systems

II M.TECH, III-SEMESTER & IV-SEMESTER (CSE)

Code	Subject	Credits	Internal Marks	External Marks	Total
D0525153	Seminar	2	100	-	100
D0526154	Project work	12	-	-	-

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M.Tech, I-Sem (CSE)

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(D0501151)OPERATING SYSTEMS**OBJECTIVES:**

- This course deals with functions, structures and history of operating systems.
- To understand the design issues associated with operating systems.
- To understand various process management concepts including scheduling, synchronization, deadlocks.
- To be familiar with multithreading and the concepts of memory management including virtual memory.
- To understand the issues related to file system interface and implementation, disk management with protection and security mechanisms. Some example operating systems (UNIX, Windows, Solaris etc.)

OUTCOMES:

- At the end of the course the students know the need and requirement of an interface between Man and Machine.
- To enable them to identify the difference between the system software and the application software and their design requirements.
- Students will be able to relate the features of operating systems and the fundamental theory associated with process, memory and file management components of different operating systems.
- Students will learn about and understand theoretical concepts and programming constructs used for the operation of modern operating systems.
- Students will gain practical experience with software tools available in modern operating systems such as semaphores, system calls, sockets and threads.

UNIT I

Operating Systems Overview: What operating Systems do, Computer System Organization, Computer System Architecture, and Operating-System Operations.

Operating systems structures: Operating system services, System calls, Types of System calls, System programs, operating system structure, Operating system generation.

UNIT II

Process Management: Process concept, Process Scheduling, Interprocess communication.

Multithreaded Programming: Overview, Multithreaded Models.

Process Scheduling: Basic Concepts, Scheduling Criteria, Scheduling algorithms.

UNIT III

Synchronization: Background, The critical-section problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classic problems of synchronization, Monitors.

Principles of deadlock: System model, Deadlock characterization, Deadlock prevention, Detection and Avoidance, Recovery from deadlock.

UNIT IV

Memory Management: Background, Swapping, Contiguous memory allocation, Paging, Structure of the page table, segmentation.

Virtual memory Management: Background, Demand paging, Page-replacement (Basic Page replacement, FIFO, Optimal, LRU), Allocation of frames, Thrashing.

UNIT V

File system: File concept, Access Methods, Directory and Disk Structure, File sharing, Protection.

Implementing File Systems: File system structure, File system implementation, Directory implementation, Allocation methods, and Free-space management.

UNIT VI

Secondary Storage Structure: Overview of Mass-storage structure, Disk structure, disk attachment, disk scheduling, Disk Management, Swap-space management, RAID structure, stable-storage implementation, Tertiary storage structure.

TEXT BOOKS:

1. Operating System Concepts, Abraham Silberchatz, Peter B. Galvin, Greg Gagne, Eighth edition, John Wiley.
2. Operating Systems, A Concept based Approach- D.M.Dhamdhare, Second Edition, TMH.

REFERENCES:

1. Operating Systems: Internals and Design Principles, Stallings, Sixth Edition–2009, Pearson Education.

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M.Tech, I-Sem (CSE)

T	C
4	4

(D0502151)ADVANCED DATA STRUCTURES AND ALGORITHMS**OBJECTIVES:**

- This course explores data structures, and the practical problems of implementing those structures in real programming languages and environments
- How the field of algorithms are developed.
- Significance of algorithm efficiency.
- Significance and importance of program correctness.

OUTCOMES:

- Explain the basic concepts of time and space complexity, divide-and-conquer strategy, dynamic programming, greedy algorithms, amortized analysis.
- Describe the methodologies of how to analyze an algorithm.
- Identify the complexity of problems.
- Solve a problem using an algorithm and evaluate its correctness.
- Formulate the time-complexity analysis for an algorithm.

UNIT I

Trees and Graphs: Introduction, Definition and Basic terminologies of trees and binary trees, Representation of trees and Binary trees, Binary tree Traversals, Threaded binary trees, Graphs-basic concepts, representation and traversals.

UNIT II

Binary Search Trees, AVL Trees and B Trees: Introduction, Binary Search Trees: Definition, Operations and applications. AVL Trees: Definition, Operations and applications. B Trees: Definition, Operations and applications.

UNIT III

Red – Black Trees, Splay Trees and Hash Tables: Red – Black Trees, Splay Trees and its applications. Hash Tables: Introduction, Hash Tables, Hash Functions and its applications.

UNIT IV

Algorithm Analysis: Efficiency of algorithms, Apriori Analysis, Asymptotic Notations, Time complexity of an algorithm using O notation, Polynomial Vs. Exponential Algorithms, Average, Best, and Worst Case Complexities, Analyzing Recursive Programs.

UNIT V

Divide – and – Conquer & Greedy Method: General Method, Binary Search, Finding Maximum and Minimum, Quick Sort, Merge sort, Stassen's Matrix Multiplication, Greedy Method- General Method, Minimum Cost Spanning Trees, Single Source Shortest Path.

UNIT VI

Dynamic Programming and Back Tracking: General Method, All Pairs Shortest Path, Single Source Shortest Path, 0 / 1 Knapsack problem, Reliability Design, Traveling Sales Person's Problem. **Back Tracking:** General Method, 8 – Queen's Problem, Graph Coloring.

TEXT BOOKS:

1. Data Structures and Algorithms by G.A.V. Pai, 2009, TMH.
2. Fundamentals of Computer Algorithms by Ellis Horowitz, SartajSahni and SanguthevarRajasekaran, 2nd edition, University Press.

REFERENCE BOOKS:

1. Classic Data Structures by D. Samanta, 2005, PHI
2. Design and Analysis of Computer Algorithms by Aho, Hopcraft, Ullman 1998, PEA.
3. Introduction to the Design and Analysis of Algorithms by Goodman, Hedetniemi, TMG.
4. Design and Analysis of Algorithms by E. Horowitz, S. Sahani, 3rd Edition, Galgotia.
5. Data Structures and Algorithms in C++ by Drozdek 2nd Edition, Thomson.

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COMPUTER SCIENCE ENGINEERING

M.Tech, I-Sem (CSE)

T	C
4	4

(D0503151)COMPUTER ORGANIZATION**OBJECTIVES:**

- To understand the structure, function, characteristics and performance issues of computer systems.
- To understand the design of the various functional units of digital computers.
- To understand the basic processing unit and how they are connected and how it generates control signals (using hardwired and micro programmed approaches).
- To understand the architecture of 8086.
- To understand the different types of memory and how they are related.

OUTCOMES:

- Students will learn about computer performance, computer design, and trade-offs between cost and performance as well as between hardware and software.
- Students will formulate and solve problems, understand the performance requirements of systems.
- Students will learn to communicate effectively and learn to think creatively and critically, both independently and with others.
- Students will learn about all the detailed design issues and circuits of each unit.

UNIT-I

BASIC STRUCTURE OF COMPUTERS: Computer Types, Functional unit, Basic OPERATIONAL concepts, Bus structures, Software, Performance, multiprocessors and multi computers, Data Representation, Fixed Point Representation, Floating – Point Representation, Error Detection codes.

UNIT-II

REGISTER TRANSFER LANGUAGE AND MICROOPERATIONS: Register Transfer language, Register Transfer, Bus and memory transfers, Arithmetic Micro operations, Logic micro operations, Shift micro operations.

BASIC COMPUTER ORGANIZATION AND DESIGN: Instruction codes, Computer Registers, Computer instructions, Instruction cycle, Memory- reference instructions, Input – Output and Interrupt.

CENTRAL PROCESSING UNIT: Stack organization, Instruction formats, Addressing modes, Data transfer and manipulation, Program control, Reduced Instruction set computer.

UNIT-III

MICRO PROGRAMMED CONTROL: Control memory, Address sequencing, micro program example, design of control unit, Hardwired control, Micro programmed control

COMPUTER ARITHMETIC: Addition, subtraction, multiplication and Division Algorithms, Floating – point Arithmetic operations, Decimal Arithmetic unit, Decimal Arithmetic operations.

UNIT-IV

THE MEMORY SYSTEM: Basic concepts semiconductor RAM memories, Read-only memories, Cache memories, Performance considerations, Virtual memories, Secondary storage, Introduction to RAID.

UNIT-V

PIPELINE AND VECTOR PROCESSING: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline Vector Processing, Array Processors.

UNIT-VI

MULTI PROCESSORS: Characteristics of Multiprocessors, Interconnection Structures, Interprocessor Arbitration. InterProcessor Communication and Synchronization Cache Coherence, Shared Memory Multiprocessors.

TEXT BOOKS:

1. Computer Systems Architecture – M. Moris Mano, III Edition, Pearson/PHI
2. Computer Organization – Car Hamacher, Zvonks Vranesic, Safea Zaky, V Edition, McGraw Hill.

REFERENCES:

1. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI

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(D0504151) DATABASE MANAGEMENT SYSTEMS**OBJECTIVES:**

- Advantages applications of DBMS and Database system structure.
- Schema design: ER model and conceptual design.
- Relational model and SQL basics.
- Relational algebra and Query optimization.
- Storage and efficient retrieval of data: various indexing techniques.

OUTCOMES:

- Students will learn about the need for DBMS, the largeness of the data and why it gives rise to steam oriented processing and strategies and are at higher level than general purpose programming language such as JAVA.
- Students will learn about storage and efficient retrieval of large Information via algebraic query optimization and the use of indexing.
- Students will also learn basics of SQL and about primary key concepts and foreign key concepts. They will also learn about data manipulation (insertions deletions &update) and triggers.
- Students will learn about functional dependency and the need for schema refinement (normalization) to remove redundancy of data.
- Students will also learn about transaction management concurrency Control and crash recovery.

UNIT – I

Data base System Applications, data base System VS file System – View of Data – Data Abstraction – Instances and Schemas – data Models – the ER Model – Relational Model – Other Models – Database Languages – DDL – DML – database Access for applications Programs – data base Users and Administrator – Transaction Management – data base System Structure – Storage Manager – the Query Processor – History of Data base Systems. Data base design and ER diagrams – Beyond ER Design Entities, Attributes and Entity sets – Relationships and Relationship sets – Additional features of ER Model – Concept Design with the ER Model

UNIT – II

Relational Model : Introduction to the Relational Model – Integrity Constraint Over relations – Enforcing Integrity constraints – Querying relational data – Logical data base Design – Introduction to Views – Destroying /altering Tables and Views.

Relational Algebra and Calculus:Relational Algebra – Selection and projection set operations – renaming – Joins – Division – Examples of Algebra Queries – Relational calculus – Tuple relational Calculus – Domain relational calculus.

UNIT – III

Form of Basic SQL Query – Examples of Basic SQL Queries – Introduction to Nested Queries – Correlated Nested Queries Set – Comparison Operators – Aggregative Operators – NULL values – Comparison using Null values – Logical connectivity's – AND, OR and NOTR – Impact on SQL Constructs – Outer Joins – Disallowing NULL values – Complex Integrity Constraints in SQL Triggers and Active Data bases.

UNIT – IV

Schema refinement – Problems Caused by redundancy – Decompositions – Problem related to decomposition – reasoning about FDS – FIRST, SECOND, THIRD Normal forms – BCNF – Lossless join Decomposition – Dependency preserving Decomposition – Schema refinement in Data base Design – Multi valued Dependencies – forth Normal Form.

UNIT – V

Overview of Transaction Management : ACID Properties – Transactions and Schedules – Concurrent Execution of transaction – Lock Based Concurrency Control – Performance Locking – Transaction Support in SQL.

Concurrency Control:Serializability, and recoverability – Introduction to Lock Management – Lock Conversions – Dealing with Dead Locks – Specialized Locking Techniques – Concurrency without Locking.

UNIT – VI

Overview of Storage and Indexing : Data on External Storage – File Organization and Indexing – Cluster Indexes, Primary and Secondary Indexes – Index data Structures – Hash Based Indexing – Tree base Indexing – Comparison of File Organizations. **Storing data: Disks and Files :**The Memory Hierarchy – Redundant Arrays

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of Independent – Disks – Disk Space Management – Buffer Manager – Files of records – Page Formats – record formats

TEXT BOOKS:

1. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, TATA McGraw-Hill 3rd Edition
2. Data base System Concepts, Silberschatz, Korth, McGraw hill, IV edition.

REFERENCES:

1. Introduction to Database Systems, By ITL Education Solutions Ltd.(Pearson Publisher)
2. Data base Systems design, Implementation, and Management, Rob & Coronel 5th Edition. Thomson
3. Data base Management System, ElmasriNavrate Pearson Education
4. Data base Management System Mathew Leon, Leon Vikas.
5. Data base Systems, Connoley Pearson education.

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(D0505151) SOFTWARE ENGINEERING**OBJECTIVES:**

- To understand Software development as a process.
- Various software process models and system models.
- Various software designs: Architectural, object oriented , user interface etc.
- Software testing methodologies overview: various testing techniques including white box testing black box testing regression testing etc.
- Software quality: metrics, risk management quality assurance etc.

OUTCOMES:

- Students will learn to work as a team and to focus on getting working project done on time with each student being held accountable for their part of the project.
- Student will learn about risk management and quick prototyping de-risk project management.
- Students will learn about and go through the software life cycle with emphasis on different process requirements design and implementation phases.
- Students will learn about software process models and hoe to choose an Appropriate model for their project will learn about risk management and quick prototyping to de-risk projects.

UNIT I

Introduction to Software Engineering: The evolving role of software, Changing Nature of Software, Software myths.

A Generic view of process: Software engineering- A layered technology, a process framework, The Capability Maturity Model Integration (CMMI), Process patterns.

UNIT II

Process models: The waterfall model, Incremental process models, Evolutionary process models, The Unified process.

System models: Context Models, Behavioral models, Object models.

UNIT III

Requirements engineering process: Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management.

Software Requirements: Functional and non-functional requirements, User requirements, System requirements, the software requirements document.

UNIT IV

Design Engineering: Design process and Design quality, Design concepts.

Creating an architectural design: Software architecture, Data design, Architectural styles and patterns, Architectural Design.

UNIT V

Performing User interface design: Golden rules, User interface analysis and design, interface analysis, interface design steps, Design evaluation.

Testing Strategies: A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing, Validation testing, System testing.

UNIT VI

Risk management: Reactive vs. Proactive Risk strategies, software risks, Risk identification, Risk projection, Risk refinement, RMMM, RMMM Plan.

Quality Management : Quality concepts, Software quality assurance, Software Reviews, Statistical Software quality Assurance, Software reliability, The ISO 9000 quality standards.

TEXT BOOKS:

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition.McGrawHill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson education.

REFERENCES:

1. Software Engineering- K.K. Agarwal&Yogesh Singh, New Age International Publishers
2. Software Engineering, an Engineering approach- James F. Peters, WitoldPedrycz, John Wiely.
3. Systems Analysis and Design- ShelyCashman Rosenblatt, Thomson Publications.
4. Software Engineering principles and practice- Waman S Jawadekar, The McGraw-Hill Companies.

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(D0506151) WEBTECHNOLOGIES**OBJECTIVES:**

- This course demonstrates an in-depth understanding of the Web technologies necessary for business application design and development. The course covers client side scripting like HTML, JavaScript and server side scripting like servlets, JSPs. And also XML and web servers and database interfacing.

OUTCOMES:

- Development of a business application.
- Implementation of given client side and server side technologies.
- Design and develop static and dynamic web pages.
- Validate web page data with database data.
- Knowledge on Web Application Development.

UNIT I

HTML Common tags:List, Tables, images, forms, Frames; Cascading Style sheets; Introduction to Java Scripts, Objects in Java Script, Dynamic HTML with Java Script.

UNIT II

XML:Document type definition, XML Schemas, Document Object model, Presenting XML, Using XML Processors: DOM and SAX

UNIT III

Java Beans:Introduction to Java Beans, Advantages of Java Beans, BDK Introspection, Using Bound properties, Bean Info Interface, Constrained properties Persistence, Customizes, Java Beans API.

UNIT IV

Web servers & Servlets:Tomcat Server installation & Testing.

Introduction to Servlets:Lifecycle of a Servlet, JSDK, The Servlet API, The javax.servelet Package, Reading Servlet parameters, Reading initialization parameters, The javax.servelet HTTP package, Handling Http Request & Responses, Using Cookies-Session Tracking, Security Issues.

UNIT V

Introduction to JSP: The Problem with Servlet. The Anatomy of a JSP Page, JSP Processing. JSP Application Design with MVC architecture.

JSP Application Development: Generating Dynamic Content, Using Scripting Elements Implicit JSP Objects, Conditional Processing – Displaying Values Using an Expression to Set an Attribute, Declaring Variables and Methods Error Handling and Debugging Sharing Data Between JSP pages, Requests, and Users Passing Control and Date between Pages – Sharing Session and Application Data.

UNIT VI

Database Access: Database Access, Database Programming using JDBC Studying Javax.sql.* package Accessing a Database from a JSP Page Application – Specific Database Actions Deploying JAVA Beans in a JSP Page

TEXT BOOKS:

1. Web Programming, building internet applications, Chris Bates 2nd edition,WILEY Dreamtech (UNIT 1,2)
2. The complete Reference Java 2 Fifth Edition, Patrick Naughton and Herbert Schildt., TMH (Chapters: 25) (UNIT 2,3)
3. Java Server Pages –Hans Bergsten, SPD O'Reilly (UNITs 3,4,5)

REFERENCE BOOKS:

1. Programming world wide web-Sebesta, Pearson Core SERVLETS ANDJAVASERVER PAGES VOLUME 1: CORE TECHNOLOGIES , Marty Hall and Larry Brown Pearson

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(D0507151) ADS & DBMS LAB**OBJECTIVES:**

- Learn how to implement some useful data structures.
- Understand the effect of data structures on an algorithm's complexity.
- To develop skills to design and analyze simple linear data structures
- Create and delete database schemas and execute SQL queries
- Make Use of PL/SQL Variables.

OUTCOMES:

- Basic ability to analyze algorithms and to determine algorithm correctness and time efficiency class.
 - At the end of this lab session, the student will be able to design and analyze the time and space efficiency of the data structure
 - Have practical knowledge on the application of data structures
 - Implement the given schema on a relational DBMS.
 - Design, develop, and maintain Oracle Database Objects.
- 1) Write a C/C++ program to implement Binary Tree Traversals.
 - 2) Write a C/C++ program to implement AVL tree.
 - 3) Write a C/C++ program to implement Binary Search Tree.
 - 4) Write a C/C++ program to implement Quick Sort method
 - 5) Write a C/C++ program to implement Minimum cost spanning trees.
 - 6) Write a C/C++ program to implement all pairs Shortest Path.

7). Consider the Insurance database given below. The primary keys are underlined and the data types are specified:**PERSON** (driver-id:string,name:string,address:string)**CAR** (Regno:string,model:string,year:int)**ACCIDENT** (report-number:int,date:date,location:string)**OWNS** (driver-id:string,regno:string)**PARTICIPATED**(driver-id:string,regno:string,report-number:int,damage-amount:int)

1. Create the above tables by properly specifying the primary keys and the foreign keys
2. Enter atleast five tuples for each relation
3. Demonstrate how you
 - a) Update the damage amount for the car with a specific regno in accident with report number 12 to 25000
 - b) Add a new accident to the database
4. Find the total number of people who owned cars that were involved in accidents in 2006.
5. Find the number of accidents in which cars belonging to a specific model were involved.

8). Consider the following relations for an order processing database application in a company.**CUSTOMER** (Cust #: int, Cname: string, City: string)**ORDER** (Order #: int, Odate: date, Cust #: int, Ord-Amt: int)**ORDER-ITEM** (Order #: int, Item #: int, qty: int)**ITEM** (Item #: int, Unit Price: int)**SHIPMENT** (Order #: int, Warehouse #: int, Ship-Date: date)**WAREHOUSE** (Warehouse #: int, City: string)

- i) Create the above tables by properly specifying the primary keys and the foreign keys.
- ii) Enter at least five tuples for each relation.
- iii) Produce a listing: **CUSTNAME**, **NO_OF_ORDERS**, **AVG_ORDER_AMT**, where the middle column is the total number of orders by the customer and the last column is the average order amount for that customer.
- iv) List the **Order#** for the orders that were shipped from all the warehouses that the company has in a specific city.
- v) Demonstrate how you delete **Item#** 10 from the **ITEM** table and make that field *null* in the **ORDER-ITEM** table.

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9). Consider the following database of student enrollment in courses and books adopted for each course .

STUDENT (regno :string, name : string, major : string, bdate : int)

COURSE (course# :int, cname : string, dept : string)

ENROLL (regno : string, course#:int, sem: int , marks : int)

BOOK_ADAPTION(course#:int, sem:int, book_isbn:int)

TEXT(book_isbn:int , book-title : string , publisher : string , author : string).

- i) Create the above tables by properly specifying the primary keys and the foreign key.
- ii) Enter atleast five tuples for each relation.
- iii) Demonstrate how you add a new text book to the database and make this book be adopted by some department.
- iv) Produce a list of text books (include course #,book_isbn, book-title) in the alphabetical order for courses offered by the cs department that use more than 2 books.
- v) List any department that has all its adopted books published by specific publisher.

10). Consider the following relations for the details maintained by a book dealer.

AUTHOR (Author-id: int, Name: string, City: string, Country: string)

PUBLISHER (Publisher-id: int, Name: string, City: string, Country: string)

CATALOG (Book-id: int, title: string, author-id: int, Publisher-id: int, Category-id: int, Year: int, Price: int)

CATEGORY (Category-id: int, Description: string)

ORDER-DETAILS (Order-no :int, Book-id: int, Quantity: int)

- i) Create the above tables by properly specifying the primary keys and the foreign keys.
- ii) Enter at least five tuples for each relation.
- iii) Give the details of the authors who have 2 or more books in the catalog and the price of the books is greater than the average price of the books in the catalog and the year of publication is after 2000.
- iv) Find the author of the book which has maximum sales.
- v) Demonstrate how you increase the price of books published by a specific publisher by 10%.

11). Consider the following database for a banking enterprise

BRANCH (branch_name: string, branch_city: string, assets: real)

ACCOUNT (accno: int, branch_name: string, balance: real)

CUSTOMER (customer_name: string, customer_street: string, city:string)

DEPOSITOR (customer_name: string, accno: int)

LOAN (loan_number: int, branch_name: string, amount: real)

BORROWER (customer_name: string, loan_number: int)

- i) Create the above tables by properly specifying the primary keys and the foreign keys.
- ii) Enter at least five tuples for each relation.
- iii) Find all the customers who have at least two accounts at the MAIN branch.
- iv) Find all the customers who have an account at all branches located in a specific city.
- v) Demonstrate how you delete all account tuples at every branch located in a specific city.

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(D0508151) WEBTECHNOLOGIES LAB**OBJECTIVE:**

- To create a fully functional website with mvc architecture.
- To develop an online Book store using we can sell books (Ex amazon .com).

Hardware and Software required:

- A working computer system with either Windows or Linux.
- A web browser either IE or firefox.
- Tomcat web server and Apache web server
- XML editor like Altova Xml-spy [www.Altova.com/XMLSpy – free] , Stylus studio , etc.,
- A database either MySQL or Oracle.

1. Write HTML to implement lists.
2. Write HTML to navigate from one page to another and to navigate within the page.
3. Write HTML to display time-table in a web page.
4. Write HTML for registration form.
5. Write HTML for login form.
6. Write HTML to develop home page using frames.
7. Write HTML to implement cascading style sheets.
8. Write java script to validate login form.
9. Write java script to validate registration form.
10. Write a simple XML for customer information of a super market.
11. Validate XML using Document Type Definition.
12. Write an XSL to display library data held by an XML.
13. Write an XML for student data. Retrieve second student data and display it using DOM.
14. Develop colors java bean using BDK.
15. Install tomcat web server. Write a simple servlet that displays a message.
16. Write a servlet that reads input data from request and displays them as response.
17. Write a servlet that handles HTTP GET & HTTP POST.
18. Write a servlet that creates and retrieves cookie.
19. Write a servlet that implements a session.
20. Write a JSP to implement cookie.
21. Write a servlet that retrieves data base data and displays in a web page.
22. Write a servlet that validates login form with data base data.

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C 2

(D0509151) COMPREHENSIVE VIVA-I

Student has to undergo a comprehensive viva pertaining to his specialization which carries 50 marks in each semester. He has to secure 50% marks to obtain required credits. Comprehensive viva will be conducted at the end of 1st and 2nd semester by the committee consisting of HOD, senior faculty member and external Examiner from outside the institute. For this, HOD of the Department shall submit a panel of 4 Examiners, who are eminent in that field. One from the panel will be selected by the principal of the institute as external Examiner for comprehensive viva.

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(D0510152)MOBILE APPLICATION DEVELOPMENT

OBJECTIVES:

- Describe those aspects of mobile programming that make it unique from programming for other platforms,
- Critique mobile applications on their design pros and cons,
- Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces,
- Program mobile applications for the Android operating system that use basic and advanced phone features, and
- Deploy applications to the Android marketplace for distribution.

OUTCOMES:

- Be exposed to technology and business trends impacting mobile applications
- Be competent with the characterization and architecture of mobile applications.
- Be competent with understanding enterprise scale requirements of mobile applications
- Be competent with designing and developing mobile applications using one application development framework

UNIT I

J2ME Overview: Java 2 Micro Edition and the World of Java, Inside J2ME, J2ME and Wireless Devices.

Small Computing Technology: Wireless Technology, Radio Data Networks, Microwave Technology, Mobile Radio Networks, Messaging, Personal Digital Assistants, Mobile Power, Set-Top Boxes, Smart Cards.

UNIT II

J2ME Architecture and Development Environment:J2ME Architecture, Small Computing Device Requirements, Run-Time Environment, MIDlet Programming, Java Language for J2ME, J2ME Software Development Kits, Hello World J2ME Style, Multiple MIDlets in a MIDlet Suite, J2ME Wireless Toolkit.

UNIT III

J2ME Best Practices and Patterns: The Reality of Working in a J2ME World, Best Practices.

Commands, Items and Event Processing:J2ME UserInterfaces, Display Class, The Palm OS Emulator, Command Class, Item Class, Exception Handling.

UNIT IV

High-Level Display Screens:Screen Class, Alert Class, Form Class, Item Class, List Class, Text Box Class, Ticker Class

UNIT V

Low-Level Display Canvas:The Canvas, User Interactions, Graphics, Clipping Regions, Animation

UNIT VI

Record Management System- Record Storage, Writing and Reading Records, Record Enumeration, Sorting Records, Searching Records, Record Listener.

JDBC Objects:The Concept of JDBC, JDBC Driver Types, JDBC Packages, Overview of the JDBC Process, Database Connection, statement Objects, Result set, Transaction Processing, Metadata, Data Types, Exceptions.

TEXT BOOKS:

1. J2ME: The Complete Reference, James Keogh, Tata McGrawHill.

REFERENCES:

1. Enterprise J2ME: Developing Mobile Java Applications – Michael Juntao Yuan, Pearson Education, 2004
2. Beginning Java ME Platform, Ray Rischpater, Apress, 2009
3. Beginning J2ME: From Novice to Professional, Third Edition, Sing Li, Jonathan B. Knudsen, Apress, 2005
4. Kicking Butt with MIDP and MSA:Creating Great Mobile Applications,1stedition,J.Knudsen,Pearson.

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(D0511152) OBJECT ORIENTED ANALYSIS AND DESIGN**OBJECTIVES:**

- Describe and explain concepts and principles of object oriented software development
- Describe and explain fundamental theories, techniques and methods in software engineering
- Master basic object oriented modelling principles
- Describe and explain basic concepts and constructs in the Java programming language
- Implement programs in the Java programming language

OUTCOMES:

- Analyze and model requirements and develop software using object-oriented analysis and design.
- Express object models in UML
- Use CASE tools for software design.
- Work as a member of a software development team.

UNIT I**Introduction to UML:**

Importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, Architecture, Software Development Life Cycle.

UNIT II

Basic Structural Modeling:Classes, Relationships, common Mechanisms, and diagrams.

Advanced Structural Modeling:Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages.

UNIT III

Class & Object Diagrams:Terms, concepts, modeling techniques for Class & Object Diagrams.

UNIT IV

Basic Behavioral Modeling-I:Interactions, Interaction diagrams.

Basic Behavioral Modeling-II:Use cases, Use case Diagrams, Activity Diagrams.

UNIT V

Advanced Behavioral Modeling:Events and signals, state machines, processes and Threads, time and space, state chart diagrams.

UNIT VI

Architectural Modeling:Component, Deployment, Component diagrams and Deployment diagrams.

Case Study:The Unified Library application.

TEXT BOOKS:

1. The Unified Modeling Language User Guide, Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson Education.
2. UML 2 Toolkit, Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado, WILEY-Dreamtech India Pvt. Ltd.

REFERENCES:

1. Fundamentals of Object Oriented Design in UML, Meilir Page-Jones, Pearson Education.
2. Modeling Software Systems Using UML2, Pascal Roques, WILEY- Dreamtech India Pvt. Ltd.
3. Object Oriented Analysis and Design, AtulKahate, The McGraw-Hill Companies.
4. Object-Oriented Analysis and Design with the Unified Process, John W. Satzinger, Robert B Jackson and Stephen D Burd, Cengage Learning.
5. Learning UML 2.0, Russ Miles and Kim Hamilton, O'Reilly, SPD.
6. Applying UML and Patterns: An introduction to Object – Oriented Analysis and Design and Unified Process, Craig Larman, Pearson Education.
7. UML and C++, R.C.Lee and W.M.Tepfenhart, PHI.
8. Object Oriented Analysis, Design and Implementation, B.Dathan and S.Ramnath, Universities Press.
9. OO Design with UML and Java, K.Barclay, J.Savage, Elsevier.
10. Mark Priestley: Practical Object-Oriented Design with UML, TMH.

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(D0512152) COMPUTER NETWORKS**OBJECTIVES:**

- An understanding of the overriding principles of computer networking, including protocol design, protocol layering, algorithm design, and performance evaluation.
- An understanding of computer networking theory, including principles embodied in the protocols designed for the application layer, transport layer, network layer, and link layer of a networking stack.
- An understanding of specific implemented protocols covering the application layer, transport layer, network layer, and link layer of the Internet (TCP/IP) stack.
- An understanding of security issues.

OUTCOMES:

- Students will learn to list and classify network services, protocols and architectures, explain why they are layered.
- Student will learn to explain key Internet applications and their protocols.
- Students will learn to explain security issues in computer networks.
- To master the terminology and concepts of the OSI reference model and the TCP-IP reference model.
- To master the concepts of protocols, network interfaces, and Design/performance issues in local area networks and wide area networks.

UNIT 1

Introduction: Uses of computer networks, Network Hardware, Network Software, References Models, ARPANET, NSFNET

UNIT II

The Physical Layer: The Theoretical Basis for Data Communication Guided Transmission Media, Wireless Transmission, Switching, Circuit Switching, Packet Switching, Message Switching.

UNIT III

The Data Link Layer: Data link Layer Design Issues, Elementary Data Link Protocols, Sliding Window Protocols, HDLC, The data Link layer in the Internet.

UNIT IV

The Medium Access Control Sublayer: The Channel allocation Problem, Multiple Access protocols, Ethernet-Ethernet Cabling, Manchester Encoding, The Ethernet MAC Sublayer Protocol. The Binary Exponential Backoff Algorithm, Ethernet Performance, Switched Ethernet, Fast Ethernet. Wireless Lans- The 802.11 Protocol Stack, The 802.11 Physical Layer, The 802.11 MAC SubLayer Protocol, The 802.11 Frame Structure.

UNIT V

The Network Layer: Network Layer Design Issues, Routing Algorithms, Congestion Control Algorithms. Internetworking, The Network Layer in the Internet.

UNIT VI

The Transport Layer: The Transport Service, Elements of Transport Protocols, The Internet Transport Protocols: UDP, The Internet Transport Protocols: TCP.

TEXT BOOKS:

1. Computer Networks, Andrew S. Tanenbaum, Fouth Edition, Pearson Education.

REFERENCES:

1. Computer Communications and Networking Technologies, Michael A. Gallo, William M. Hancock, Cengage Learning.
2. Computer Networks: Principles, Technologies and Protocols for Network Design, Natalia Olifer, Victor Olifer, Wiley India.
3. Data Communications and Networking, Behrouz A. Forouzan, Fourth Edition, Tata McGraw Hill.
4. Understanding Communications and Networks, Third Edition, W.A.Shay, Cengage Learning.
5. Computer and Communication Networks, Nader F. Mir, Pearson Education
6. Computer Networking: A Top-Down Approach Featuring the Internet, James F.Kurose, K.W.Ross, Third Edition, Pearson Education.
7. Data and Computer Communications, G.S.Hura and M.Singhal, CRC Press, Taylor and Francis Group.

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(D0513152) DATA WAREHOUSING AND DATA MINING

OBJECTIVES:

- With the basic data warehousing and data mining concepts.
- To learn mining rules in large databases.
- To get idea on clustering analysis.
- Applications that can enable them to set up and manage an industrial data warehousing and data mining system.
- To learn about OLTP and OLAP systems.

OUTCOMES:

- Ability to do Conceptual, Logical, and Physical design of Data Warehouses.
- Familiarity with Requirements Engineering for Data Warehouses.
- OLAP applications and OLAP deployment.
- Have a good knowledge of the fundamental concepts that provide the foundation of data mining.
- Learn broad classes of data mining technologies.

UNIT – I**Introduction:**

Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Data Mining task primitives, Integration of data mining system with Data base or Data Warehouse system, Major issues in Data Mining.

UNIT – II

Data Warehouse and OLAP Technology: Overview of Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, From Data Warehousing to Data Mining.

UNIT – III

Data Preprocessing: Need of preprocessing the data, Descriptive Data Summarization, Data Cleaning, Data Integration and Transformation, Data Reduction, Data Discretization and Concept Hierarchy Generation.

UNIT – IV

Mining Frequent patterns, Associations, and Correlations: Basic Concepts, Efficient and Scalable Frequent Item set Mining methods, Mining Various Kinds of Association Rules, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.

UNIT – V

Classification: Overview of Classification and Prediction, Issues Regarding Classification and Prediction, Bayesian Classification, Classification by Decision Tree Induction, Rule-Based Classification, Classification by Back propagation, Support Vector Machines, Lazy Learners: k-Nearest-Neighbor Classifiers, Prediction, Accuracy and Error Measures, Evaluating the Accuracy of a Classifier or Predictor, Ensemble Methods- Increasing the Accuracy.

UNIT – VI

Cluster Analysis I: Overview of Cluster Analysis, Types of data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density-Based Methods.

TEXT BOOKS:

1. Data Mining – Concepts and Techniques - JIAWEI HAN & MICHELINE KAMBER Harcourt India, second edition.

REFERENCES:

1. Data Mining Introductory and advanced topics–MARGARET H DUNHAM, PEARSON EDUCATION
2. Data Mining Techniques – ARUN K PUJARI, University Press.
3. Data Warehousing in the Real World – SAM ANAHORY & DENNIS MURRAY. Pearson Edition Asia.
4. Data Warehousing Fundamentals – PAULRAJ PONNAIAH WILEY STUDENT EDITION
5. The Data Warehouse Life cycle Tool kit – RALPH KIMBALL WILEY STUDENT EDITION.

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(D0514152) SOFTWARE QUALITY ASSURANCE AND TESTING**(ELECTIVE-I)****OBJECTIVES:**

- Software Testing plays a key role in software development and is a key measure that is taken against producing quality product. This course demonstrates an in-depth understanding of the Software Testing, various quality metrics that are necessary and also on various kinds of testing tools that are helpful in testing process.

OUTCOMES:

- Understanding importance of Quality & Software Testing.
- Identifying various quality metrics & standards followed by various organizations.
- Understanding various kinds of software testing techniques.
- Understanding various kinds of automation testing tools available.

UNIT I

Testing Methodology: Introduction to software Testing, Evolution of Software Testing, Goals of Software Testing, Software testing as a Process. Software Testing Terminology, Software Testing Life Cycle. Verification & Validation: Verification and Validation Activities, Verification and its requirements, Validation.

UNIT II

Software Quality Assurance Framework and Standards SQA Framework: What is Quality? Software Quality Assurance, Components of Software Quality Assurance – **Software Quality Assurance Plan:** Steps to develop and implement a Software Quality Assurance Plan – **Quality Standards:** ISO 9000 and Companion ISO Standards, CMM, CMMI, PCMM, Malcom Balridge, 3 Sigma, 6 Sigma

UNIT III

Software Quality Assurance Metrics and Measurement Software Quality Metrics: Product Quality metrics, In-Process Quality Metrics, Metrics for Software Maintenance, Examples of Metric Programs

UNIT IV

Software Testing Strategy and Environment: Establishing testing policy, structured approach to testing, test factors, Economics of System Development Life Cycle (SDLC) Testing, Defects hard to find, functional and structural testing, workbench concept

UNIT V**Software Testing Techniques:**

Black-Box, Boundary value, Bottom-up, Branch coverage, Cause-Effect graphing, CRUD, Database, Exception, Gray-Box, Histograms, Inspections, JADs, Pareto Analysis, Prototyping, Random Testing, Risk-based Testing, Regression Testing, Structured Walkthroughs, Thread Testing, Performance Testing, White-Box Testing

UNIT VI

Test Automation: Need for Automation, Categorization of Testing Tools, Overview of Some Commercial Testing Tools: WinRunner, LoadRunner, QTP, Selenium.

TEXT BOOKS:

1. Effective Methods for Software Testing, 2nd Edition, William E. Perry , Second Edition, Wiley India, 2006.
2. Software Testing Principles and Practices by NARESH CHAUHAN, OXFORD HIGHER EDUCATION, university Press.
3. Software Quality, Mordechai Ben-Menachem/Garry S. Marliss, Thomson Learning publication,1997.

REFERENCE BOOKS:

1. Testing and Quality Assurance for Component-based Software, by Gao, Tsao and Wu, Artech House Publishers
2. Software Testing Techniques, by BoriesBeizer, Second Edition, Dreamtech Press
3. Managing the Testing Process, by Rex Black, Wiley
4. Handbook of Software Quality Assurance, by G. Gordon Schulmeyer, James I.McManus, Second Edition, International Thomson Computer Press
5. Software Testing and continuous Quality Improvement, by William E.Lewis, GunasekaranVeerapillai, Second Edition, Auerbach Publications

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**(D0515152) ADVANCED COMPUTER ARCHITECTURE
(ELECTIVE-I)**

OBJECTIVES:

- A broad understanding of computer architecture.
- To the extent possible, an understanding of the current state-of-the-art in uni-processor computer architecture.
- Study how to use technology to build the best computer/processor.
- To know different levels of parallelism.

OUTCOMES:

- Broad understanding of the design of computer systems, including modern architectures and alternatives.
- Understanding of the interaction amongst architecture, applications and technology.
- Understanding of a framework for evaluating design decisions in terms of application requirements and performance measurements.
- A historical perspective on computer system design.

UNIT - I

Fundamentals of Computer design- Technology trends- cost- measuring and reporting performance quantitative principles of computer design.

UNIT - II

Instruction set principles and examples- classifying instruction set- memory addressing- type and size of operands- addressing modes for signal processing-operations in the instruction set- instructions for control flow-encoding an instruction set.-the role of compiler

UNIT - III

Instruction level parallelism (ILP)- over coming data hazards- reducing branch costs –high performance instruction delivery- hardware based speculation- limitation of ILP

UNIT - IV

ILP software approach- compiler techniques- static branch protection - VLIW approach - H.W support for more ILP at compile time- H.W verses S.W Solutions

UNIT - V

Memory hierarchy design- cache performance- reducing cache misses penalty and miss rate – virtual memory- protection and examples of VM.

UNIT - VI

Multiprocessors and thread level parallelism- symmetric shared memory architectures- distributed shared memory- Synchronization- multi threading.

TEXT BOOK:

1. Computer Architecture A quantitative approach 3rd edition John L. Hennessy & David A. Patterson Morgan Kufmann (An Imprint of Elsevier)

REFERENCES:

1. “Computer Architecture and parallel Processing” Kai Hwang and A.Briggs International Edition McGraw- Hill.
2. Advanced Computer Architectures, Dezsó Sima, Terence Fountain, Peter Kacsuk, Pearson.
3. Parallel Computer Architecture, A Hardware / Software Approach, David E. Culler, Jaswinder Pal singh with Anoop Gupta, Elsevier

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(D0516152) DISTRIBUTED DATABASES**(ELECTIVE-I)****OBJECTIVES:**

- Present the principles underlying the functioning of distributed database systems.
- Create an awareness of the major technical challenges in distributed database systems design and implementation.
- Provide experience in the implementation of typical algorithms used in distributed systems.

OUTCOMES:

- Explain what a distributed database system is, why you would design a system as a distributed database system, and what the desired properties of such systems are.
- List the principles underlying the functioning of distributed database systems, describe the problems and challenges associated with these principles, and evaluate the effectiveness and shortcomings of their solutions.
- Recognize how the principles are applied in contemporary distributed database systems, explain how they affect the software design, and be able to identify features and design decisions that may cause problems.

UNIT – I

Features of Distributed versus Centralized Databases, Principles Of Distributed Databases , Levels Of Distribution Transparency, Reference Architecture for Distributed Databases , Types of Data Fragmentation, Integrity Constraints in Distributed Databases.

UNIT – II

Translation of Global Queries to Fragment Queries, Equivalence Transformations for Queries, Transforming Global Queries into Fragment Queries, Distributed Grouping and Aggregate Function Evaluation, Parametric Queries.

UNIT – III

Optimization of Access Strategies, A Framework for Query Optimization, Join Queries, General Queries.

UNIT – IV

The Management of Distributed Transactions, A Framework for Transaction Management, Supporting Atomicity of Distributed Transactions, Concurrency Control for Distributed Transactions, Architectural Aspects of Distributed Transactions.

UNIT - V

Concurrency Control, Foundation of Distributed Concurrency Control, Distributed Deadlocks, and Concurrency Control based on Timestamps, Optimistic Methods for Distributed Concurrency Control.

UNIT – VI

Reliability, Basic Concepts, Non-blocking Commitment Protocols, Reliability and concurrency Control, Determining a Consistent View of the Network, Detection and Resolution of Inconsistency, Checkpoints and Cold Restart, Distributed Database Administration, Catalog Management in Distributed Databases, Authorization and Protection.

TEXT BOOKS:

1. Distributed Database Principles & Systems, Stefano Ceri, Giuseppe Pelagatti McGraw-Hill.

REFERENCES:

1. Principles of Distributed Database Systems, M.TamerOzsu, Patrick Valduriez – Pearson Education.

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(D0517152) STORAGE AREA NETWORKS**(ELECTIVE-I)****OBJECTIVES:**

- Describe the Challenges in Data Storage and Data Management.
- Create an awareness of the major physical components of a Disk drive and its functioning.
- Provide experience in the implementation of different RAID levels and their suitability for different application environments.

OUTCOMES:

- Understand the architecture of backup/Recovery and various topologies.
- List various Replication technologies and their role in ensuring information availability.
- Explain various Remote Replication technologies.
- Provide the knowledge of various Industry Standards for Data Centric monitoring and management.
- Describe Information security and critical security attributes for information systems.

UNIT I

Review data creation and the amount of data being created and understand the value of data to a business, challenges in data storage and data management, Solutions available for data storage, Core elements of a data center infrastructure, role of each element in supporting business activities.

UNIT II

Hardware and software components of the host environment, Key protocols and concepts used by each component, Physical and logical components of a connectivity environment, Major physical components of a disk drive and their function, logical constructs of a physical disk, access characteristics, and performance Implications.

UNIT III

Concept of RAID and its components, Different RAID levels and their suitability for different application environments: RAID 0, RAID 1, RAID 3, RAID 4, RAID 5, RAID 0+1, RAID 1+0, RAID 6, Compare and contrast integrated and modular storage systems, High-level architecture and working of an intelligent storage system.

UNIT IV

Evolution of networked storage, Architecture, components, and topologies of FC-SAN, NAS, and IP-SAN, Benefits of the different networked storage options, Understand the need for long-term archiving solutions and describe how CAS fulfills the need, Understand the appropriateness of the different networked storage options for different application environments

UNIT V

List reasons for planned/unplanned outages and the impact of downtime, Impact of downtime, Differentiate between business continuity (BC) and disaster recovery (DR), RTO and RPO, Identify single points of failure in a storage infrastructure and list solutions to mitigate these failures. Architecture of backup/recovery and the different backup/recovery topologies, replication technologies and their role in ensuring information availability and business continuity, Remote replication technologies.

UNIT VI

Identify key areas to monitor in a data center, Industry standards for data center monitoring and management, Key metrics to monitor for different components in a storage infrastructure, Key management tasks in a data center.

Information security, Critical security attributes for information systems, Storage security domains, List and analyzes the common threats in each domain.

Virtualization technologies, block-level and file-level virtualization technologies and processes.

TEXT BOOKS:

1. Information Storage and Management, EMC Corporation, Wiley.

REFERENCES:

1. Storage Networks: The Complete Reference, Robert Spalding, Tata McGraw Hill, Osborne, 2003.
2. Building Storage Networks, Marc Farley, Tata McGraw Hill, Osborne, 2001.
3. Storage Area Network Fundamentals, Meeta Gupta, Pearson Education Limited, 2002.

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**(D0518152) HUMAN COMPUTER INTERACTION
(ELECTIVE-II)**

OBJECTIVES:

1. To expose students to the central concepts of Human-Computer Interaction.
2. Establish target users, functional requirements, and interface requirements for a given computer application
3. Describe and explain user interface design principles, and apply them to designing an interface.
4. Develop quick-and-dirty interface designs using rapid prototyping methods.

OUTCOMES:

1. Apply HCI principles and a user-centered approach to interaction design.
2. Analyze user needs and requirements.
3. Design and develop prototypes based on user assessments (needs and requirements), while applying HCI principles and models.
4. Apply evaluation and usability testing methods to interactive products to validate design decisions.

UNIT - I

Introduction: Importance of user Interface – definition, importance of good design. Benefits of good design. A brief history of Screen design.

UNIT - II

The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface.

UNIT - III

Design process – Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business junctions.

UNIT - IV

Screen Designing : Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design.

UNIT - V

Windows – Select the proper kinds of Windows: Characteristics, Components of a window, Presentation Styles, Types of Windows, Window Management, Window Operations. Select the Proper Device-Based controls: Characteristics, Selecting the Proper Device-Based Control.

UNIT - VI

Components – text and messages, Icons and increases – Multimedia, colors, uses problems, choosing colors.
Interaction Devices – Keyboard and function keys – pointing devices – speech recognition digitization and generation – image and video displays – drivers.

TEXT BOOKS:

1. The essential guide to user interface design, Wilbert O Galitz, Wiley DreamaTech.
2. Designing the user interface. 3rd Edition Ben Shneidermann , Pearson Education Asia.

REFERENCES :

1. Human – Computer Interaction. ALAN DIX, JANET FINCAY, GRE GORYD, ABOWD, RUSSELL
2. BEALG, PEARSON.
3. Interaction Design PRECE, ROGERS, SHARPS. Wiley Dreamtech,
4. User Interface Design, SorenLauesen , Pearson Education.

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**(D0519152) SOFTWARE PROJECT MANAGEMENT
(ELECTIVE-II)**

OBJECTIVE:

- The objective of the course is to familiarize students in practice with the initiation, management and supervision of a software project.
- During the course, actual software projects are defined and their implementation is managed and supervised.
- To provide basic project management skills with a strong emphasis on issues and problems associated with delivering successful IT projects.
- The module is designed to provide an understanding of the particular issues encountered in handling IT projects and to offer students methods, techniques and 'hands-on' experience in dealing with them.

OUTCOMES:

- Understand and practice the process of project management and its application in delivering successful IT projects;
- evaluate a project to develop the scope of work, provide accurate cost estimates and to plan the various activities;
- understand and use risk management analysis techniques that identify the factors that put a project at risk and to quantify the likely effect of risk on project timescales;
- Identify the resources required for a project and to produce a work plan and resource schedule;

UNIT - I**Conventional Software Management:** The waterfall model, conventional software Management performance.**Evolution of Software Economics:** Software Economics, pragmatic software cost estimation.**Improving Software Economics:** Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections**UNIT - II****The old way and the new:** The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process.**Life cycle phases:** Engineering and production stages, inception, Elaboration, construction, transition phases.**UNIT - III****Artifacts of the process:** The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts.**Model based software architectures:** A Management perspective and technical perspective.**Work Flows of the process:** Software process workflows, Iteration workflows.**UNIT - IV****Checkpoints of the process:** Major mile stones, Minor Milestones, Periodic status assessments.**Iterative Process Planning:** Work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning.**UNIT - V****Project Organizations and Responsibilities:** Line-of-Business Organizations, Project Organizations, evolution of Organizations.**Process Automation:** Automation Building blocks, The Project Environment.**UNIT - VI****Project Control and Process instrumentation:** The seven core Metrics, Management indicators, quality indicators, life cycle expectations, pragmatic Software Metrics, Metrics automation.**Tailoring the Process:** Process discriminants, Example: small-scale versus large-scale project.**TEXT BOOK:**

1. Software Project Management, Walker Royce: Pearson Education, 2005.

REFERENCES:

1. Software Project Management, Bob Hughes and Mike Cotterell: Tata McGraw-Hill Edition.
2. Software Project Management, Joel Henry, Pearson Education. Software Project Management in practice, Pankaj Jalote, Pearson Education. 2005.

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**(D0520152) IMAGE PROCESSING
(ELECTIVE-II)****OBJECTIVES:**

- To learn the fundamentals of Image Processing.
- To learn sampling and reconstruction procedures.
- To learn the various transforms used in image Processing.
- To study various concepts of image enhancement, reconstruction and image compression.
- To design image processing systems.

OUTCOMES:

- Develops ability to identify, formulate & solve problems involving images.
- Develops ability to design & conduct experiments, analyze & interpret image data.
- To design a software, Component or process as per needs & specifications.
- It will demonstrate the skills to use modern engineering tools, software's & equipment to analyze problems.
- Develop confidence for self-education & ability for life-long learning.

UNIT - I

Introduction :Examples of fields that use digital image processing, fundamental steps in digital image processing, components of image processing system.. Digital Image Fundamentals: A simple image formation model, image sampling and quantization, basic relationships between pixels (p.nos. 15-17, 21- 44, 50-69).

UNIT - II

Image enhancement in the spatial domain :Basic gray-level transformation, histogram processing, enhancement using arithmetic and logic operators, basic spatial filtering, smoothing and sharpening spatial filters, combining the spatial enhancement methods (p.nos 76-141).

UNIT - III

Image restoration : A model of the image degradation/restoration process, noise models, restoration in the presence of noise—only spatial filtering, Weiner filtering, constrained least squares filtering, geometric transforms; Introduction to the Fourier transform and the frequency domain, estimating the degradation function (p.nos 147-167, 220-243, 256-276).

UNIT - IV

Color Image Processing : Color fundamentals, color models, pseudo color image processing, basics of full-color image processing, color transforms, smoothing and sharpening, color segmentation (p.nos: 282- 339).

UNIT - V

Image Compression :Fundamentals, image compression models, error-free compression, loss predictive coding, image compression standards (p.nos: 409-467,492-510).

UNIT - VI

Morphological Image Processing :Preliminaries, dilation, erosion, open and closing, hit or miss transformation, basic morphologic algorithms (p.nos:519-550).

Image Segmentation :Detection of discontinuous, edge linking and boundary detection, thresholding, region-based segmentation (p.nos: 567-617).

TEXT BOOK :

1. Digital Image Processing, RafealC.Gonzalez, Richard E.Woods, Second Edition, Pearson Education/PHI.

REFERENCES :

1. Image Processing, Analysis, and Machine Vision, Milan Sonka, Vaclav Hlavac and Roger Boyle, Second Edition, Thomson Learning.
2. Introduction to Digital Image Processing with Matlab, Alasdair McAndrew, Thomson Course Technology
3. Computer Vision and Image Processing, Adrian Low, Second Edition, B.S.Publications
4. Digital Image Processing using Matlab, RafealC.Gonzalez, Richard E.Woods, Steven L. Eddins, Pearson Education.
5. Digital Image Processing, William K. Prat, Wily Third Edition
6. Digital Image Processing and Analysis, B. Chanda, D. DattaMajumder, Prentice Hall of India, 2003.

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(D0521152) DISTRIBUTED SYSTEMS**(ELECTIVE-II)****OBJECTIVES:**

- Present the principles underlying the functioning of distributed systems;
- Create an awareness of the major technical challenges in distributed systems design and implementation;
- Expose students to modern and classic technology used in distributed systems and their software;
- Provide experience in the implementation of typical algorithms used in distributed systems

OUTCOMES:

- Explain what a distributed system is, why you would design a system as a distributed system, and what the desired properties of such systems are;
- List the principles underlying the functioning of distributed systems, describe the problems and challenges associated with these principles, and evaluate the effectiveness and shortcomings of their solutions;
- Recognize how the principles are applied in contemporary distributed systems, explain how they affect the software design, and be able to identify features and design decisions that may cause problems;
- Design a distributed system that fulfills requirements with regards to key distributed systems properties (such as scalability, transparency, etc.), be able to recognize when this is not possible, and explain why;

UNIT-I**Introduction of Distributed System:** Goals, Hardware Concepts, Software Concepts, the Client-Server Model.**UNIT-II****Communication:** Remote Procedure Call, Remote Object Invocation, Message Oriented Communication, Stream-Oriented Communication.**UNIT-III****Processes:** Threads, Clients, Servers, Code Migration, Software Agents. **NAMING:** Naming Entities, Locating Mobile Entities.**UNIT-IV****Synchronization:** Clock Synchronization, Logical Clocks, Global State, Election Algorithms, Mutual Exclusion, Distributed Transactions.**UNIT-V****Consistency And Replication:** Introduction, Data-Centric Consistency Models, Client Centric Consistency Models, Distribution Protocols, Consistency Protocols, Examples.**UNIT-VI****Fault Tolerance:** Introduction to Fault Tolerance, Process Resilience, Reliable Client-Server Communication, Reliable Group Communication, Distributed Commit, Recovery.**TEXT BOOKS**

1. Andrew S. Tanenbaum, Maarten Van Steen. Distributed Systems – Principles and Paradigms 2/e, PHI, 2004.

REFERENCE BOOKS

1. Pradeep K. Sinha, “Distributed Operating Systems Concepts and Design”, PHI 2002.
2. Randy Chow Theodore Johnson, “Distributed Operating Systems and Algorithm Analysis”, PEA, 2009.
3. George Coulouris, Jean Dollimore, Tim Kind berg, “Distributed Systems Concepts and Design”, 3/e, PEA, 2002.

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(D0522152) OOAD LAB**OBJECTIVES:**

- Individually, or in teams, perform specific software development task; collecting and analysing requirements; develop and evaluate a design; test and document an implementation
- Individually, or in teams, perform a software development project using object oriented technology.

OUTCOMES:

- Use case tools for software design.
 - Express object models in UML
1. The student should take up the case study of Unified Library application which is mentioned in the theory, and Model it in different views i.e. Use case view, logical view, component view, Deployment view, Database design, forward and Reverse Engineering, and Generation of documentation of the project.
 2. Student has to take up some more case studies of his/her own interest and do the same whatever mentioned in first problem. Some of the ideas regarding case studies are given in reference books which were mentioned in theory syllabus can be referred for some idea.

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3	2

(D0523152) DATA WAREHOUSING AND DATA MINING LAB

OBJECTIVES:

- Applications that can enable them to set up and manage an industrial data warehousing and data mining system.
- To get knowledge by practicing programs.

OUTCOMES:

- Familiarity with requirements engineering for data warehouses.
 - Have a good knowledge of the fundamental concepts that provide the foundation of data mining.
- 1) Implement the following data mining Techniques in C/C++/Java Language
 - a) Data Cleaning
 - b) Data Integration and Transformation
 - c) Data Reduction
 - d) Data Discretization and Concept hierarchy Generation
 - 2) Association Rule Mining
 - a) Apriori Algorithm (With candidate generation)
 - b) FP-Growth Algorithm (Without candidate generation)
 - 3) Classification methods
 - a) Naïve Bayes
 - b) Back Propagation
 - c) SVM
 - d) k-NNC
 - 4) Clustering Methods
 - a) k-Means
 - b) k-Medoids (Partition Medoids)
 - c) BIRCH
 - d) DBSCAN

Implementation of data mining algorithms by attribute relation file formats in weka tool.

- 5) Develop an application to implement OLAP rollup, slice and dice operation.
- 6) Develop an application to construct a multidimensional data.

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C 2

(D0524152) COMPREHENSIVE VIVA –II

Student has to undergo a comprehensive viva pertaining to his specialization which carries 50 marks in each semester. He has to secure 50% marks to obtain required credits. Comprehensive viva will be conducted at the end of 1st and 2nd semester by the committee consisting of HOD, senior faculty member and external Examiner from outside the institute. For this, HOD of the Department shall submit a panel of 4 Examiners, who are eminent in that field. One from the panel will be selected by the principal of the institute as external Examiner for comprehensive viva.

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C 2

(D0525153) SEMINAR

For Seminar 100 marks shall be for internal evaluation. The candidate has to secure a minimum of 50 marks to be declared successful. The assessment will be made by a board consisting of HOD and two internal experts at the end of 3rd semester.

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C 12

(D0526154)PROJECT WORK

Every candidate shall be required to submit thesis or dissertation after taking up a topic approved by the Department.

Registration of Project work: The candidate is permitted to register for the project work after satisfying the attendance requirement of all the courses (theory and practical courses of 1st & 2nd Sem)

An **Internal Department Committee (I.D.C.)** consisting of HOD, Supervisor and One Internal senior expert shall monitor the progress of the project work.

The work on the project shall be initiated in the penultimate semester and continued in the final semester. The duration of the project is for two semesters. The candidate can submit Project thesis with the approval of I.D.C. after **36 weeks** from the date of registration at the earliest. Extension of time within the total permissible limit for completing the programme is to be obtained from the Head of the Institution.

The student must submit status report at least in three different phases during the project work period. These reports must be approved by the I.D.C. before submission of the Project Report.

The candidate shall be allowed to submit the thesis/dissertation only after passing in all the prescribed subjects (both theory and practical) and then take viva voce examination of the project. The viva - voce examination may be conducted once in two months for all the candidates submitted during that period.

Three copies of the Thesis/Dissertation certified in the prescribed form by the supervisor & HOD shall be submitted to the institute.

The Department shall submit a panel of 4 experts for a maximum of 4 students at a time. However, the thesis/dissertation will be adjudicated by the board consists of HOD, concerned supervisor and one external Examiner from other institute nominated by the principal from a panel of Examiners submitted by the Department HOD to the Controller of Examinations.

If the report of the board is favourable in viva voce examination, the board shall jointly report candidates work as:

Good
Satisfactory
Not satisfactory

If the report of the viva voce is not satisfactory the candidate will retake the viva voce examination after three months. If he fails to get a satisfactory report at the second viva voce examination he will not be eligible for the award of the degree unless the candidate is permitted to revise and resubmit the thesis.